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been paid. During the summer of 1904 some instances were found where companies organized on this basis had sold the prescribed number of rights and were ready to turn the works over to the farmers, but the farmers preferred to have the original company continue to operate the canal, the farmers continuing to make the annual payments agreed upon in their original contracts. They were satisfied with the management, and preferred to have one superintendent with ample authority, and not directly responsible to them or dependent upon them for his position, to operate the canal. There is, however, the danger in such an arrangement that a change in management might be unsatisfactory, when the farmers would have no redress.

That the co-operative stock company with the stock in the hands of the farmers using the water is generally regarded as the most satisfactory system of canal management is borne out by data collected by the writer in Colorado in 1904. It was found that in the districts watered by the South Platte River and its tributaries in Colorado about 85 per cent. of the land is watered by canals controlled in this way.

R. P. TEELE.

WASHINGTON

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## CENSUS STATISTICS OF CHILD LABOR

In drawing conclusions from statistics of the United States Census it is of first importance that we understand that variations in census methods of enumeration, and in the degree of efficiency with which the canvass had been conducted from decade to decade, render naïve comparisons of these statistics impossible. Failure to recognize this fact results inevitably in serious error and has often led to conclusions that are precisely the opposite of the truth.

While this criticism of incomparability is to some extent applicable to all census data, it is especially applicable to census statistics relating to the employment of children.

Following the publication of the reports of 1890, eminent economists and statistical authorities, comparing the figures of child labor of that census with those of the census of 1880, drew the conclusion that there had been a great decrease in the number of children at work. That this conclusion was erroneous is evident when the figures of 1880 and 1890 are compared with those of the present

census. Unfortunately, the Census Office, while concluding that there was a slight increase instead of a great decrease in the number of children employed in gainful occupations during the decade 1880 to 1890, is quite as careless in making comparisons and drawing conclusions as were these eminent authorities when arriving at an opposite conclusion.<sup>1</sup> In the following table we add the corresponding figures for the present census to those of preceding censuses in the form in which they were presented by Commissioner Wright:<sup>2</sup>

NUMBER AND PERCENTAGE OF CHILDREN AT WORK DURING THE FOUR  
CENSUS YEARS 1870, 1880, 1890, and 1900

Census Years and Classification of Ages	Males	Females	Total
1870			
Total children, 10 to 15 years, inclusive...	2,840,200	2,764,169	5,604,369
Number of above at work.....	548,064	191,100	739,164
Percentage of above at work.....	19.30	6.91	13.19
1880			
Total children, 10 to 15 years, inclusive...	3,376,114	3,273,369	6,649,483
Number of above at work.....	825,187	293,169	1,118,356
Percentage of above at work.....	24.44	8.96	16.82
1890			
Total children, 10 to 14 years, inclusive...	3,574,787	3,458,722	7,033,509
Number of above at work.....	400,586	202,427	603,013
Percentage of above at work.....	11.21	5.85	8.57
1900			
Total children, 10 to 15 years, inclusive...	4,852,427	4,760,825	9,613,252
Number of above at work.....	1,264,411	485,767	1,750,178
Percentage of above at work.....	26.05	10.23	18.25

In the foregoing table there is an apparent difference in the age classification in 1890 of one year, but, as a matter of fact, as was shown in the article referred to in note 2, there was an actual difference of one and a half years for that part of the age period in which by far the largest number of children are employed. This is due to a difference in the question as to age asked by census enumerators, that question in 1890 being "age nearest birthday," and at every other census, including that of 1900, "age last birthday." Thus the figures for 1890 include children up to the age of fourteen and one-

<sup>1</sup> Mayo-Smith, *Statistics and Economics*, p. 86; and *vide* statement of Carroll D. Wright in *Eleventh Annual Report of the Department of Labor* and in *Outlines of Practical Sociology*.

<sup>2</sup> *Vide* the criticism of Colonel Wright's conclusions as to the number of children employed in 1890 made by the present writer in the *Journal of Political Economy* for December, 1899.

half years, and those for other censuses include children up to the sixteenth birthday. This difference resulting from the change in the age question is ignored by the statistician of the present census report on occupations, just as it had been formerly ignored by Commissioner Wright when he drew his conclusion of a great decrease in child labor from 1880 to 1890. Because of the failure to consider this important difference in census method, and the fact that the enumeration of 1890 was notoriously incomplete and unreliable, especially in the rural districts, this census report falls into serious errors in its attempt to explain the very evident discrepancy between the figures of 1890 and those of 1900.

By far the most serious of these errors is the conclusion that the remarkable increase in the number of children reported in 1900 as compared with 1890 is due chiefly to the more specific instructions to the enumerators of the present census. That the instructions of 1900 were more specific than those of preceding censuses is true, but they were specific in directing that children having occupations should not be so enumerated unless the period of their employment exceeded that of their school attendance. No such limitation is found in the instructions to enumerators of previous censuses, and this is, we believe, a fact of the greatest importance in evaluating the census statistics of child labor. That there exists no basis of comparison between the figures of 1900 and those of 1890 is admitted, and the report has taken the mean between the number reported in 1900 and 1880 as probably a fair representation of the number at work in 1890.

It is also admitted that the instructions to enumerators in 1880 and 1890 were practically the same. This being the case, if the difference in the instructions of 1900 resulted in a more complete enumeration at that census as compared with the enumeration of 1890, it should also result in a more complete enumeration as compared with that of 1880. Were this the fact, there would exist no basis of fair comparison between the figures of 1900 and those of 1880, and the Census Office would not be justified in its conclusion that there has been since 1880 a slight increase in the number of child workers relatively to the increase in population.

But if, on the other hand, the change in census instructions, as we propose to demonstrate, was such as excluded from enumeration at the present census large numbers of children that would have been enumerated under the instructions of previous censuses, then the actual increase in the number of child workers must be much greater

than appears from the comparisons that are instituted by the Census Office. That the increase in the number of children enumerated as workers in 1900 over the enumeration of 1890 is greater than can be attributed to the difference in age classification must be admitted, but this great increase is readily explained by the general incompleteness of the canvass of 1890. That the deficiency in the enumeration of 1890, which is shown to be chiefly of agricultural laborers, is not due to the lack of explicitness in the instructions to enumerators is evident from the fact that at the census of 1880, with the same instructions, the enumeration was probably more complete than at any other census. This evidence becomes conclusive when we discover that the proportion of children enumerated as agricultural laborers in 1880 was considerably greater than at the present census.

There is no doubt that the fact that the census schedules in 1890 called for a greater amount of information than it was possible to obtain in the limited time allowed for the canvass was responsible for much that was unreliable and incomplete in the returns. Congressman Hopkins, in introducing the bill for the present census, said with reference to this defect in the last census :

The only trouble was that such a mass of information was required from the enumerators that their returns were not accurate, and in many cases had to be taken again. In the Eleventh Census 250 questions were prepared on a schedule by the director of the census and placed in the hands of the enumerators, each of whom was obliged to collect in his locality the information covered by these questions. . . . Under such circumstances it will readily be seen that accurate and desirable information, such as should be embodied in a report of this character, could not be collected.<sup>3</sup>

Congressman Johnson, of Indiana, in this same debate said :

Mr. Carroll D. Wright, who succeeded Mr. Porter in his office, declared positively — and I think that we all have reason to know his statements to be true — that the last census was an exceedingly unreliable, and was also a very extravagant, piece of work.

Required to obtain answers to so many questions in a limited time, census enumerators in a large proportion of cases neglected to ask some of these questions, and one of the questions most likely to be omitted was that relating to a child's occupation.<sup>4</sup>

<sup>3</sup> *Congressional Record*, Vol. XXXII, p. 1510.

<sup>4</sup> Regarding this matter General Francis A. Walker, superintendent of the Ninth and Tenth Censuses, said at the Ninth Census: "The reason why the occupation tables may be taken as substantially exact as they respect the adult male labor of the country, but not as they report the employment of women and

With regard to the incompleteness of the Eleventh Census in the rural districts, Colonel Wright said in a letter to the present writer:

The canvass of the principal cities was undoubtedly more thorough than at 1880; but, on the other hand, it is believed that the canvass of the rural districts was more complete in 1880.<sup>5</sup>

Commissioner Wright had here particular reference to the canvass of manufacturing industries, but, as this canvass in the rural districts was made by the enumerators of population, it is fair to assume that their returns on the population schedules were in like manner deficient.

In the special *Report on Occupations* of the present census (p. lxvi) we find, under the heading "Probable Deficiency in Number of Children Reported as at Work in 1890," the following statement:

In the discussion relating to occupations in the "Report on Population" for 1890 attention was called to the marked decrease shown in the proportion of persons ten to fourteen years of age at work, as compared with the proportion of those ten to fifteen years of age at the preceding census; but as the instructions to enumerators in 1890 were practically the same as those which had been prepared by General F. A. Walker, superintendent of the Tenth Census, and used by him in 1880, there did not appear to be any good reason for doubting the accuracy of the returns of 1880. Moreover, confidence in these returns was strengthened by the fact that the changes they seemed to indicate were such as might easily have occurred, and possible reasons for these variations were suggested in the report for 1890. But when the figures for the succeeding census (1900) became available, an analysis of the returns for 1890, in the light of those for both 1880 and 1900, at once revealed the fact that the abrupt change shown in 1890 was not maintained in 1900; on the contrary, the proportion of children from ten to fifteen years of age who were at work in 1900 showed significant uniformity with the proportion in 1880, especially in the southern states, in which the supposed change in 1890 was most pronounced. It appeared not unlikely, therefore, that the census of 1890 understated the number of children from ten to fourteen years of age gainfully occupied.

children, are plain and simple. It is taken for granted that every man has an occupation. . . . It is precisely the other way with women and young children. The assumption is, as the fact generally is, that they are not engaged in remunerative employment. Those who are so engaged constitute the exception, and it follows from a plain principle of human nature that the assistant marshals will not infrequently forget or neglect to ask the question.

<sup>5</sup> This letter is quoted in an article by the present writer in this *Journal*, Vol. IV, p. 88.

It is to be regretted that the age period representing children employed in 1890 (ten to fourteen) differs slightly from that used in 1880 and 1900 (ten to fifteen), because no readjustment of the figures can make the three census periods comparable with absolute accuracy. But even if allowance be made for some variation due to this cause, there still remains so marked a difference in the figures for 1890 that some other explanation is demanded. From a careful study of such facts as are available, the following conclusions appear to be justified:

1. The similarity of the proportions, in all states and territories, of persons between ten and fifteen years of age gainfully employed in 1880 and 1900 proves that there has been no marked change in this age group during the twenty-year period. Therefore the marked deficiency in the proportion of persons from ten to fourteen years of age gainfully employed in 1890 should be regarded as probably erroneous.

2. This deficiency was practically confined to agricultural pursuits, and within this main class to agricultural laborers; it was most marked in the southern states, and for the entire country appears to have been considerably more than half a million.

3. By using for 1890 the mean between figures based upon the proportions of each sex from ten to fifteen years of age at work in 1880 and 1900 for each state and territory, the total number of agricultural laborers is increased by 582,522. The use of the mean is justified by the facts, and produces figures more trustworthy than the actual returns for 1890.

Following this statement, under the caption "Analysis of Returns for 1890," elaborate tables are presented showing the number of children from ten to fourteen years of age as reported for both 1890 and 1900, with the remark:

As the figures for the number of children gainfully occupied in 1900 were prepared for both the ten to fourteen and ten to fifteen age periods, it is possible to make an exact comparison of the former with the returns for 1890 and of the latter with 1880.

As the number of children reported in 1900 as from ten to fourteen include children up to the fifteenth birthday, and the figures for 1890 include children up to the age of fourteen and a half years, it thus appears that the Census Office regards as "exact" a comparison that disregard a difference of one-half year.

Now let us see what this difference amounts to, and whether the difference in the age classification of 1890 and 1900 is so slight a matter as the Census Office appears to regard it. Fortunately, the present census publishes the number of children enumerated as workers in 1900 for each yearly age period. These figures are as follows:

	Total Number of Children	Males	Females
Ten years of age.....	142,105	105,580	36,525
Eleven years of age.....	158,778	119,628	39,150
Twelve years of age.....	221,313	163,649	57,664
Thirteen years of age.....	268,427	196,830	71,597
Fourteen years of age.....	406,701	289,655	117,046
Fifteen years of age.....	552,854	389,069	163,785
Aggregate number.....	1,750,178	1,264,411	485,767

The question as to age at the present census being "age last birthday," these figures include all children from ten to sixteen years of age. At the census of 1890, the question was "age nearest birthday," and, as a consequence, the number of children reported at that census include those from nine and a half to fourteen and a half years of age. It may be noticed in the foregoing table that the number of children in the last two years is very nearly 55 per cent. of the entire number, and that the number in the last year is considerably more than three times that of the first year.

Now let us see how many of the children reported at the present census would be included in the age period of the census of 1890. As the figures of the present census include children to the sixteenth birthday, and those of the former census those under fourteen and a half, we must deduct from the total number reported in 1900 a number representing children from fourteen and a half to sixteen years of age. To obtain this number we must add to the number reported as fifteen years of age, which is 552,854, some figure representing the number of children in the last half of the preceding age period. It may be noticed that the number reported as fourteen years of age exceeded the number reported as thirteen by 51.5 per cent. If we assume that the number in the last half of the fourteen-year period exceeded the number in the first half of that period in the same ratio, then we must conclude that the number for that half-year was 244,977. Adding this to 552,854, the number reported as fifteen years of age, we have 797,831 as the number of children from fourteen and a half to sixteen years. But while we deduct this number from the total number 1,750,178, we must add some figure as representing the number of children from nine and a half to ten years. Obviously this number would be comparatively small. It may be noticed, further, that the number reported as ten years of age



is 90 per cent. of the number reported as eleven years of age. If now we assume that the number in the first half of the ten-year period was also 90 per cent. of the number for the last half, and that the number in the half-year nine and a half to ten was 90 per cent. of the number estimated for the first half of the ten-year period, we obtain 51,087 as the number of children from nine and a half to ten years of age. With the addition of this number and the deduction of 797,831 representing the number of children from fourteen and a half to sixteen years of age, we have 1,003,434 as the number of children in 1900 for the age period corresponding to that of 1890. This, it will be seen, is less by 193,890 than the number presented in the "exact" comparison of Table VII.

Thus it appears that the "slight" difference in the age periods resulted in increasing the number of children enumerated in 1900 to the extent of 746,734, or 74.4 per cent.

If now we increase the figures of 1890 to this extent, we have 1,051,654 as the number of children from ten to fifteen years inclusive at that census. The foregoing computation does not, however, fully indicate the deficiency in the number of child workers reported in 1890 resulting from the "slight" difference in the age period. This becomes quite evident when, segregating child workers engaged in agriculture, we compare the number of children found in other pursuits. As it appears, and is admitted, that there exists a great deficiency in the number of child workers enumerated in 1890, and that this deficiency is almost entirely of children engaged in agriculture, it is obvious that the only reliable basis of comparison between the statistics of child labor of the census of 1890 and those of other censuses is found in the figures for non-agricultural industries. These comparisons are also instructive as indicating the extent of the increase in child labor in those industries in which such labor must be regarded as most objectionable. The number of children engaged in agriculture and non-agricultural pursuits as reported at the present census is as follows:

Age Period	Agricultural Pursuits	Non-Agricultural Pursuits
Ten years of age.....	121,422	20,683
Eleven years of age.....	131,807	26,971
Twelve years of age.....	171,643	49,670
Thirteen years of age....	179,393	89,034
Fourteen years of age....	215,678	191,023
Fifteen years of age.....	242,028	310,826
Total.....	1,061,971	688,207

These figures show conclusively that the number of children enumerated at the present census as engaged in non-agricultural pursuits for the age period corresponding to that of the census of 1890, is no greater than the number reported at that census. As we have previously shown, the age period of child workers of the present census is from ten to sixteen years of age, and at the preceding census it was from nine and a half to fourteen and a half years. It may be noticed that the number of children for the fourteen-year age period is considerably more than double that of the thirteen-year period. If we assume that the number from fourteen and a half to fifteen years of age exceeded that from fourteen to fourteen and a half in a like ratio, we should take something over 68 per cent. of the number of children reported as from fourteen to fifteen years of age. But to be well within the mark, let us assume that the number of children from fourteen and a half to fifteen exceeded the number from fourteen to fourteen and a half by but 50 per cent. This would give us 60 per cent. of 191,023, or 114,613. Adding this to the number reported as from fifteen to sixteen, we have a total of 425,439 as the number from fourteen and a half to sixteen years of age. Deducting this from the number representing children of all ages, and adding 10,000 as representing children from nine and a half to ten years of age, we have 272,768 as the number of children in non-agricultural pursuits from nine and a half to fourteen and a half years of age at the present census. The number reported in 1890 was 275,988, which is greater by 3,220 than the number which we have found for the present census.

Thus with a decided increase in population and of non-agricultural industries there is no apparent increase in the number of children of the age period of the census of 1890 engaged in non-agricultural pursuits. This is explained, in part at least, by the fact that the instructions to enumerators of the present census exclude from enumeration a large proportion of the child workers that would have been enumerated under the instructions of previous censuses. The number of children employed in agricultural and non-agricultural industries as reported at the different censuses is as follows:

Year	Agricultural Pursuits	Non-Agricultural Pursuits
1870.....	499,558	239,606
1880.....	720,729	397,627
1890.....	328,115	275,998
1900.....	1,060,971	688,207

No explanation of the change in age classification in 1890 has ever been offered by the Census Office. We know, however, that the result has been to conceal the fact that there was a decided increase, instead of a decided decrease, in the number of child workers from 1880 to 1890. That there was probably an increase the Census Office now admits by way of explanation of that which would otherwise appear as an unprecedented increase during the last decade.

It is noticeable that, while comparing the figures of the present census with those of 1880 and making this admission, the Census Office fails to call attention to the fact that the actual increase since 1880 must be considerably greater than appears from these comparisons.

Following the comparative tables which we have criticised, we find this statement:

Examination of the schedules of 1890 makes it clear that the enumerators at that census did not properly interpret the instructions. Children at work on farms the enumerator was required to make an entry on the schedules, in the space devoted to occupations, for every person enumerated either by the return of a specific occupation or by the use of some term indicative of status in the family, as housewife for a woman keeping house; housework, for a grown daughter assisting in household duties without pay; at school; at home, for persons too young to go to school or no occupation. The entries for non-working members of the household were not so specifically required in 1880, and 1890 doubtless the enumerator, when uncertain concerning the younger members of a family, either used the entry at school or left the space blank.

With this statement, which appears to be hardly justified by the facts, is presented the following footnote:

The instructions concerning this subject issued to enumerators in 1890 (which were practically identical with those issued in 1880) were as follows: The doing of domestic errands or family chores out of school hours, where a child regularly attended school, whatever the age, is earning money regularly by labor, contributing to the family support, or appreciably assisting in mechanical or agricultural industry, the kind of work should be stated.

The instructions to census enumerators regarding the enumeration of children at the present census<sup>6</sup> were as follows:

219. The doing of domestic errands or family chores out of school hours, where a child regularly attends school, is not an occupation. But if a boy or girl above ten years of age is earning money regularly by labor, contributing to

<sup>6</sup> *Vide* the article "‘Occupations’ in the Twelfth Census" in the preceding number of this *Journal*, p. 68.

the family support, or appreciably assisting in mechanical or agricultural industry, the kind of work performed should be stated (see paragraph 162).

This paragraph is practically identical with the instructions of the three preceding censuses, except for the reference to paragraph 162, which we give below :

162. Report a student who supports himself by some occupation according to the occupation, if more time is given to that, but as a student if more time is given to study. Thus report a student who does stenographic work as a student unless more of his time is spent in stenography. Report a salesman in a grocery store, who attends a night school as "salesman groceries," because most of his day is spent in the store (see paragraph 219).

Now, if this reference to paragraph 162 means anything at all, it means that a child attending school for a period greater than that in which he is gainfully occupied is to be reported as a student and not as having a gainful occupation.

As we have already stated no such limitation is found in the instructions at preceding censuses. At the census of 1880 the only instructions regarding the enumeration of children having occupations were as follows :

The inquiry as to occupation will not be asked in respect to infants or children too young to take any part in production. Neither will the doing of domestic errands or family chores out of school be considered an occupation. "At home" or "attending school" will be the best entry in a majority of cases. But if a boy or girl, whatever the age, is earning money regularly by labor, contributing to the family support, or appreciably assisting in mechanical or agricultural industry, the occupation should be stated.

This plainly requires the enumeration as a worker of every child occupied for any period during the census year regardless of the time spent in school.

The purport of the instructions of the present census is made plain in the very first paragraph of instruction under the heading "occupation, trade, or profession" :

154, column 19, occupation.—This question applies to every person ten years of age and over who is at work, that is occupied in gainful labor, and calls for the profession, trade, or branch of work upon which each person depends chiefly for support, or in which he is engaged ordinarily during the larger part of the time.

Just preceding the foregoing paragraph, as presented in Appendix A, is the following note :

153, note.—The following instructions concerning the return of the occupation, trade, or profession in column 19 do not, in the main, form a part of

the instructions contained in the portfolio or the instructions printed at the bottom of the illustrative example. These instructions are very important, however, and must not only be read, but studied carefully.

The instructions, as they appear in Appendix A, are those found in a book of instructions, and are not exactly identical with those printed on the lower part of the census schedule on which they made their reports, and also on the "Illustrative Example of the Method of Making Returns on Schedule No. 1 — Population." This illustrative example consists of a census schedule which has been filled out in a manner to illustrate the method to be followed in making entries. On the census schedule besides column 19, which is a broad column, we find a narrow column (21) devoted to reporting the number of months of school attendance. It was thus possible to indicate the school attendance, and also the occupation of the person when not attending school, and it is noticeable that this illustrative sheet does not give a single example of a child who attends school also having an occupation.

The directions to enumerators appearing upon the illustrative example, and also upon the lower part of the census schedule, so far as they relate to the enumeration of children, are paragraph 154, as we have quoted it from Appendix A, and the following: "For children attending school write 'at school;' for all other persons leave the column vacant." This clearly means all other persons except those for the enumeration of whose occupation direction had been given.

Enumerators who were careless, and were guided entirely by the instructions found on the census schedules upon which they made their reports and by the illustrative example, would be unlikely to report any child who attended school as having an occupation, and those who carefully studied the direction found in the pamphlet of instructions would report children as having an occupation only when the period of employment exceeded that of school attendance. The latter course was that followed by the writer, who served as census enumerator at the present census, in the district in which he at that time resided, and in which he was well acquainted.

The result of his observation is the conclusion that the instructions to enumerators of the present census resulted in the exclusion from enumeration of many children whose period of employment exceeded that of their school attendance as well as those who attended school the greater part of the year. This is so because of the general

reluctance of parents to admit that their children do not attend school for the greater part of the year. In some instances it was perfectly obvious that the parents' statements were false.

It seems clear, then, that in regard to the employment of children the instructions to enumerators for the present census were materially different from the instructions for the two previous censuses, and that this difference must have resulted in greatly reducing the number of children reported as employed in gainful occupations.

H. L. BLISS.

CHICAGO.

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### THE MARGINAL THEORY OF DISTRIBUTION

In his recent article on "Marginal Units in the Theory of Distribution," Mr. J. A. Hobson raises a number of objections to the theory which attempts to explain the distribution of wealth on the basis of the marginal productivity of the various factors. His objections seem to the present writer to be due to a misconception of certain vital points in that theory. His argument seems to be, in brief, that if the marginal unit of labor — on a farm, for example — gets all it produces, there will be nothing left over for the employer, since all units are alike and will produce equal amounts. That is, if one laborer produces as much as another, and if each one gets what he produces, the laborers will get the whole product, and there will be nothing left for anyone else. Speaking of a farmer who employs a number of laborers and other factors, he says:

How are we to conceive the profits of our farmer? If there is no surplus in the employment of the last unit, and the last unit is just as productive as any other unit, it would appear that no profit could arise. The ordinary diagrammatic representation of the "dosing" theory does indeed show a surplus derived from the employment of each increment except the marginal one. The familiar figure on the following page runs thus:

Here  $AB$  represents the entrepreneur's personal power; to it are added ten increments of land-labor-capital, to which a diminishing amount of productivity is attached, the first unit yielding the figure  $ABb^1a^1$ , the tenth yielding  $a^9b^9DC$ . The marginal increment alone receives in payment virtually its whole product; each of the others yields a surplus receiving the same payment as the last, but affording a larger product. Here the entrepreneur appears to make a large profit on all the earlier increments.

But this figure is a most fallacious one, if designed to explain how the aggregate product of the fully organized business is apportioned. For it